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# Personalized Persuasive Game Design for Youth Addiction Care

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**Abstract**

Applying persuasive games in mental healthcare contexts, especially using game-elements to support and redesign therapy, is a relatively new concept. In the youth addiction care context, patients often have comorbidities, causing a lot of differences between them. Besides this, therapists apply the therapy protocol in a specific personal way, depending on the patients' needs and what they think is appropriate to help the patient. In order to align the design to both the patient and therapist and thus to ensure effective implementation, personalization needs to be part of the gamification approach. The aim of this paper is to inform about the status of our "personalized design process" model and discuss questions on tailoring that arose during this process. Based on our experience so far, we believe that both co-design and tailoring can be applied to help enhance the users' motivation to keep interaction the gamified therapeutic intervention.

**Author Keywords**

Personalization; customization; tailoring; design; serious games; healthcare;

**ACM Classification Keywords**

K.8.0 [Personal Computing]: Games, J.4 [Social And Behavioural Sciences]: Psychology

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## Introduction

In youth addiction care, there is a lot of relapse after treatment. Within 12 months after treatment, about one third to one half of the patients are likely to return to some drug use at least once [22] and relapse while in therapy is also not an unfamiliar phenomenon. Moreover, patients in this context are typically diagnosed with comorbidities (having one or more additional disorder(s) besides a primary one) [8], which causes a lot of variety between them due to the presence of different and multiple problems. One way to develop a product that can help and suits them, is by aligning the design to their individual needs and limitations. Therefore, the therapy protocol provides freedom to therapists, so they can tailor parts of the therapy to patients, based on their expertise.

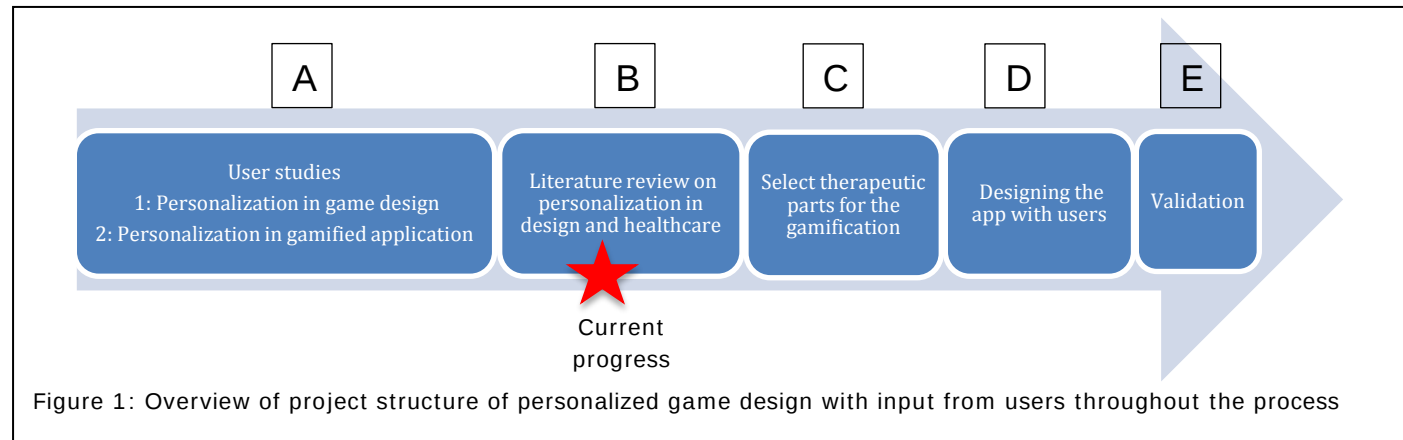
## Gamification in mental healthcare

Using games in mental healthcare contexts, especially using game-elements to support and redesign therapy, is a relatively new concept (e.g., [19]). Applying game-elements to enhance user experience, in terms of increased engagement, is becoming popular in different fields [3]. In persuasive game design, gamification design is applied in non-game contexts to facilitate the realization of aimed-for transfer effects [20]. This means that in the gamification design process, motivational game-elements are applied in a non-game context, which in our case is youth addiction care. A transfer effect is the *“Effect of user experienced game-world on forming, altering, or reinforcing user-compliance, -behavior, or -attitude, in the real world”* [20]. Applying Persuasive Game Design (PGDesign) can

enhance the motivation of users to behave in ways they find difficult, for example in remaining abstinent. It is expected that PGDesign will transport the user experience from a real-world experience towards a more motivating game-world experience. This game-world experience in turn thus facilitates the user to realize learning- or behavioral goals in their daily life.

In order to implement such a gamification approach in youth addiction care and to optimally align the game-elements in the gamified design to the motivational interest and capacities of the end-user, a design approach that includes personalization is required. This particularly holds true for the specific context of mental healthcare given 1) the complexity of the mental healthcare system for youth addiction care ranging from end-user to parents to therapists to manager to the Cognitive Behavioral Therapy protocol, 2) given the specific comorbidity of the end-user / patient [1; 7; 9], and finally 3) given the specific tailored way therapists apply the CBT protocol to each patient.

Co-design can reinforce games that aim to change behavior in mental healthcare. This is generated by involving the user and therapist to align the game to user preferences and keep the therapists' expertise in the final product. Due to the above described aspects, it could be that co-design is more important in this context, compared to others. It could be that other user groups, not involved in mental healthcare, have less differences between their users, making it easier to design a product that suits them.



Our research project is part of the more general “NextLevel” project. Gamification approaches will be designed and tested by Randomized Controlled Trials that would compare the effects of gamified interventions with non-gamified interventions. The project aims to obtain appropriate healthcare transfer effects through gamification, generate game design principles, and provide guidelines for implementation. In our research project, we will develop a co-designed and tailored gamified application, more precisely an application with game-elements, in mental healthcare. Afterwards, we would run a Randomized Controlled Trial (RCT) to further improve knowledge about the effectiveness of such a gamified application. The aim of this paper is to inform others about the importance of tailoring for the implementation of a gamified application and discuss questions on tailoring, that arose during this process in youth addiction care.

In phase A of our project (see Figure 1), we conducted a user study with PLEX cards, in order to see if these cards could be applied in both design and evaluation of paper prototype games. PLEX cards represent playful experiences [10], used to generate user’ preferences.

Seven adolescents in treatment for their addiction selected least and most preferred playful experiences. These were involved in designing two paper prototype games. Five other adolescents in treatment for their addiction evaluated the prototypes based on playful experiences. However, the results showed that other playful experiences were also present in the evaluation phase [18]. Based on this, we decided that another tool was needed for co-design along the design process with users (which, in our case, can be both patients and therapists) and to personalize a game design process.

### **Towards a personalized design process**

In general, when a game aims at influencing and improving the health of a user, he or she should be motivated to start and continue playing the game. Involving users along the whole design process, could help to enhance this motivation. Information to align the game to the preferences, needs, and competences of a target group can be collected by working closely together with them [11; 13; 14], which can increase user satisfaction with and better match the value of a product [2; 16]. This approach is called co-design. In our opinion it is important to involve users and other

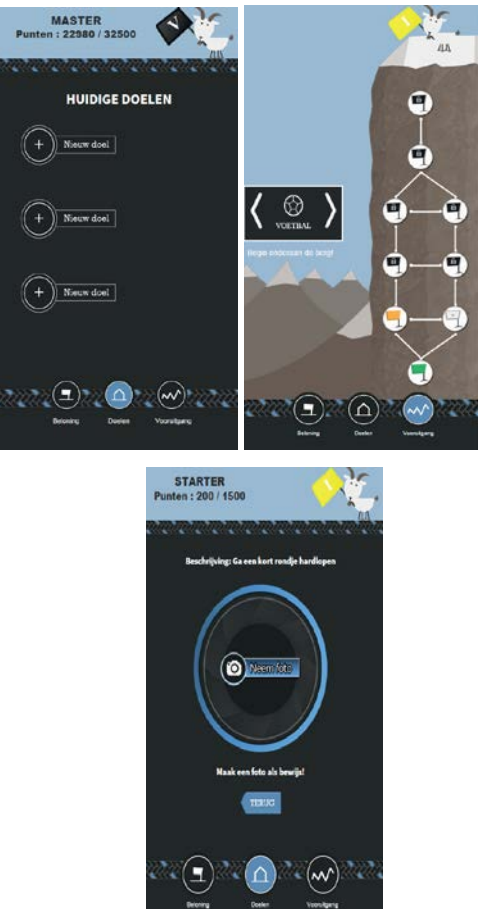


Figure 2: Screenshots from the ReadySetGoal application

stakeholders in different phases of the design process, while giving the design responsibility to the design team. Users are experts of their experiences, and designers in design. When combined, you have the best of both worlds to design a motivating persuasive game.

When aspects of a designed product can be adapted to individual users [4], it can suit different kinds of people within a target group. This is often called customization or personalization [12; 14]. With customization, the user is able to change aspects of the product (e.g., the avatar), which we refer to as “user controlled customization”. With personalization, a product is personalized by usage, which is referred to as “use dependent adaptation”. The concept of tailoring is used, since it can be an overarching concept of both personalization and customization [17]. Tailoring can enhance the value for the user and cause a sense of ownership towards the product [6]. The outcomes of the product can be attributed to the competences of the user, because he or she has designed part of the product [5].

Based on literature and discussion with the team, we developed a “personalized design process” model, which can be seen in respect to user involvement in co-design. It consist of four basic phases: exploration, ideation, embodiment and tailoring [21]. The user is thus involved in the whole design process, from problem definition in the exploration phase to tailoring the product to individual users. Within this research project, this model is used as a basis for user involvement.

## Personalizing our ReadySetGoal application

In phase A, we conducted another user study with only adolescent patients, to explore and inform about the preferred design direction of the gamification approach. The first version of the gamified application was designed based on discussions with care staff and a short test with care staff and adolescents. Care staff identified goal setting as an essential element in therapy (Exploration). Based on user characteristics, five gamification concepts were created and tested with nine clients and eight care staff. The gamification concepts were ranked in how much they thought it would be enjoyable or work with the adolescents and be practical in therapy. Adolescents rated risk taking and personal rewards highest, while care staff rated risk taking and external rewards highest. Based on this, a first version of a mobile application was designed (Ideation) around risk taking and goal setting and achieving.

The first version of the mobile application (see Figure 2 for screenshots), which we named ReadySetGoal, was pilot-tested. The applications aimed to motivate adolescents in youth addiction care to set and achieve pre-set leisure goals. Goal setting was chosen due to the use in various Cognitive Behavioral Therapy (CBT) approaches. The design of the mobile application used game-elements which were derived from the preferences of the users and care staff. One of the results of this study showed that the users liked the idea of gamifying the process of goal setting therapy, but that they wanted more freedom in setting their own goals and wanted to set more therapy related goals [15]. It was suggested that we take a personalized design approach, in terms of game-elements and setting therapy related goals (Embodiment).

We are currently in phase B (red star of Figure 1) of our project and conducting a systematic literature review, to address co-design and game design in healthcare. We aim to address the question: How are co-design and tailoring design approaches applied in the creation of games for health and how effective are they on health-related outcomes? This study will refine the “personalized design process” model in its terminology, which is used in designing the gamified application.

After the literature study, care staff will be interviewed in phase C, to generate information about goal setting within CBT in youth addiction care (Embodiment). These goal setting aspects can then be implemented within the mobile application. In phase D, the mobile application will consist of goal setting aspects from phase C and game elements from phase A. Co-design sessions will be conducted with a group of users and a group of care staff. The purpose is to know what preferences they have in the design and to explore how to tailor the mobile application in the best way as possible to suit the characteristics of the users and better motivate them (Tailoring). Finally, in phase E, a RCT would be carried out to compare the mobile application with therapy as usual, to critically determine the effect of adding a gamified mobile application to therapy. Expected problems within the RCT are recruiting participants and involving care staff.

### **Conclusion and questions for the future**

The overall aim of our project is to gamify a therapeutic intervention by involving users along the whole design process, based on our “personalized design process” model. Based on our experience so far, we believe that both co-design and tailoring can be used to help

enhancing the users' motivation to persist in interaction with the gamified therapeutic application.

Major research questions that arose, regarding co-design and tailoring are: How much tailoring freedom can the product provide to care staff and adolescents and still remain engaging? Is co-design more effective for mental healthcare contexts in terms of realizing goal behavior, compared to other user contexts (e.g., education)? Can we still speak of a finished product in a tailored and co-designed gamification therapy?

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